SCIENCE & GOVERNMENT REPORT

17th Year of Publication

The Independent Bulletin of Science Policy

Volume XVII, Number 7 P.O. Box 6226A, Washington, D.C. 20015 April 15, 1987

Q&A: Grant Swinger on Competitiveness

Get it While You Can, Says the Sage of Science

SGR spoke recently with Dr. Grant Swinger, Director of the Center for the Absorption of Federal Funds. Dr. Swinger, who has made previous appearances in SGR's series of occasional interviews with leaders of the research community, holds the endowed Pan American Chair—for travel on the airline of that name. Soon to be republished is his classic monograph, "Overhead and Underhand: The Economics of Academic Research." Following is the text of the conversation, edited by SGR.

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SGR. *Dr. Swinger, what's new and important in your relations with federal research agencies?*

Swinger. The Big C. Nobody in research today can ignore the Big C.

SGR. *The Big C? You mean . . .*

Swinger. Competitiveness. It's the new mover. Bigger and better than anything we ever had before. And I've been through it all: Sputnik, the war on cancer, the war on crime, the crises of pollution, ecology, environment, energy, education, poverty, inner cities, outer space, medical ethics. Then there were oceanography, organic farming, solar power. You name it and we've had a program. Most are now gone though many are still needed.

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SGR. *Like what?*

Swinger. Scientific literacy, for one. We did a survey that shows the American people are abysmally ignorant of science. A majority think a mammogram is a Mother's Day greeting, that fellatio is a character in Hamlet, that cunnilingus is the Irish national airline, and reverse transcriptase is a Japanese method of shorthand. We're in bad shape.

SGR. *What are you doing about competitiveness?*

Swinger. First, we're planning to hold an exploratory conference. The planning process is rather intense. In fact, we've run off the charts for frequent flyer points. The pace is cruel. Back-to-back meetings, teleconferencing, red-eye specials. Everything moves by express mail at $12.50 a shot, at least, and still we're behind. I'm late for a meeting right now.

SGR. *Back to the exploratory conference you're planning. It would be for what purpose?*

Swinger. For the purpose of planning workshops to design a large-scale conference. One step at a time.

SGR. *What subject matter will you be dealing with at the large-scale conference?*

Swinger. We don't want to get locked in with a premature agenda. Design of the agenda is the province of an ad hoc task force that will be convening shortly. But at this point, it appears that the large-scale conference will be for

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In Brief

What's happened to the DoD-University Forum, the twice-a-year bull session highly valued by big research universities for expressing their concerns to the Pentagon's senior research officials? The Forum last met in May 1986, under co-Chairmen Donald Kennedy, President of Stanford, and Donald Hicks, DoD Under Secretary for Research and Engineering. Hicks quit DoD last fall when a major part of his duties were shifted to a newly created post, Under Secretary for Acquisition, filled by Richard P. Godwin, Vice Chairman of Bechtel. Kennedy has been on sabbatical from Stanford. Staff associated with the Forum say they don't know when, if ever, it will meet next again.

Discover, *sole survivor among the pop-science magazines that sprouted at the turn of the decade, has outlived another gloomy forecast. The January 26* Gallagher Report, *which covers the publishing industry, predicted an April 1 doomsday for the financially ailing monthly. But with ads for the first four months of 1987 totaling 183 pages—55 more than the same period last year—*Gallagher *now says prospects have brightened. The parent Time Inc.,* Gallagher *reported last month, will hang on for the summer and "make [a] decision in Fall."*

Total spending for R&D in the US will increase by a real 4.3 percent, and reach $127 billion this year, according to the latest forecast by Battelle, the research consulting firm. Industry will be the biggest spender, laying out $63 billion of its own money for R&D, and will also be the biggest performer, with the cost of its own work and government contracts totaling $94 billion. R&D spending by the federal government for the year was estimated at $59.5 billion. Another $4 billion in R&D spending was listed for academic and other non-profit organizations. A limited supply of the annual R&D forecast (23 pages) is available without charge from Editor, *Battelle Today*, 505 King Ave., Columbus, Ohio 43201; tel. 614/424-7818.

. . . Aim is to Win Funding for New Research Center

(Continued from page 1)
developing a hands-on, state-of-the-art approach. It's safe to say we're aiming for a multi-disciplinary orientation to be reflected in a new research center. The focus of the center would be industry-university collaboration.

***SGR.** On what?*

Swinger. On what? Something multidisciplinary on the cutting edge, of course. The aim is to move the frontiers by shaking off the dead weight of disciplinary tradition.

***SGR.** Could you be more specific?*

Swinger. The fact that that question gets asked is revealing, in and of itself. That's why we're producing a video and planning a poster session on the perception issue. You see, the problem of competitiveness is all-pervasive in our society. It extends from the factory floor to the poet's study. So anything goes. That's why we find more opportunities in competitiveness than in any of its predecessors on the Washington scene.

***SGR.** How multidisciplinary will this be?*

Swinger. I can tell you that our preliminary outline has rung all the bells at the Foundation. We're proposing to gather together at one meeting a group of considerable diversity for an in-depth, broad-gauged look at competitiveness. We're telling everyone to check their preconceptions at the door.

***SGR.** Who are the participants?*

Casting a Wide Net

Swinger. We'll have the usual crowd of economists, scientists, engineers, educators, Congressmen, marketing specialists, and so forth. But, in addition, we're going to have in attendance, as active participants in the substance of the conference, entertainers, athletes, spiritual leaders, and several chronically unemployed persons.

***SGR.** Quite a range of people.*

Swinger. Yes. Let me read to you from our application to the Foundation:

"The preparatory stages for the Conference on Competitiveness will utilize established expertise combined with a flexible approach aimed at broadening the dialog to encompass skills whose relevance to the topic may have increased in recent years without commensurate societal recognition."

That was hammered out by the steering committee and approved by a plenary session of the planning group.

***SGR.** How did the Foundation's program officers react to your application?*

Swinger. They were visibly impressed by the flexibility reflected in this approach. But some details remain to be worked out. At their initiative, we've had a good deal of correspondence back and forth on the advisability of including representatives of several other groups, such as law-enforcement personnel and travel agents. The aim is a further broadening of the dialog. We've tasked a small group to be thinking about this.

***SGR.** What do you see as the likely outcome of this conference?*

Swinger. We're thinking about a post-conference consultative group that would seek to liaise with foreign counterparts.

***SGR.** Foreign counterparts? Wouldn't that be giving the game away? After all, the competitiveness problem is with foreign counterparts.*

Swinger. That's the way it is now. But we have to face reality. By this time next year, who's going to remember competitiveness? For all we know, the next big drive could be for international cooperation. Remember, many have gone bust, but the Center for the Absorption of Federal Funds has survived on foresight and nimbleness.

***SGR.** Thank you, Dr. Swinger.—DSG*

DOE Labs Plan College Program

The Department of Energy has announced plans for up to 300 undergraduate science and engineering students to spend a semester next academic year in some of DOE's major laboratories, with DOE footing the costs and providing weekly stipends. A DOE announcement says the program will include seminars, workshops and training on advanced scientific instruments.

The laboratories in the program are: Argonne (near Chicago), Brookhaven (Long Island, NY), Lawrence Berkeley (Berkeley, Calif.), Oak Ridge (Oak Ridge, Tenn.), and Pacific Northwest (Richland, Wash.).

For additional information: Student Semester Research Program, Office of Energy Research, ER-44, US Department of Energy, Washington, DC 20585.

ISSN 0048-9581

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Independently published by *Science & Government Report, Inc.*, twice monthly, except once each in January, July, August, and September. Annual subscription: Institutions, $195.00 (two years, $340.00). Information about bulk and individual rates upon request. Editorial offices at 3736 Kanawha St. N.W., Washington, DC 20015. Tel. (202) 244-4135. Second-class postage at Washington, D.C. Please address all subscription correspondence to Box 6226A, Northwest Station, Washington, DC 20015. Reproduction without permission is prohibited. SGR is available on University Microfilms International. Claims for missing back issues will be filled without charge if made within six weeks of publication date.

Universities Join Industry in New Lobbying Group

Big academic research has taken a new step toward seeking political influence in Washington by teaming up with high-tech industry to form a broadly based, well-heeled lobbying organization—the Council on Research and Technology.

Founded on February 6, CORETECH, as it's called, reports that its membership, as of March 20, comprised 29 companies, 64 universities, 14 academic and industrial associations, and five big research institutes. More are said to be coming in at a fast pace.

The organization is uncommunicative about its finances, but SGR understands that the minimum membership fee is $1500 a year for universities, and more for industrial firms, which means that CORETECH has made its debut with a budget of at least $200,000, and probably a good deal more than that.

CORETECH is a departure from academe's well-established routine of entrusting lobbying on its bread-and-butter research issues to professional societies, standing associations of universities, and a few lobbyists working on contract for individual institutions. The chief lobbyist for CORETECH is Stuart Eizenstat, a Washington lawyer who was domestic policy chief in the Carter White House. His services reportedly come high.

Looking after the day-to-day affairs of the organization as Executive Director is another lawyer, Kenneth R. Kay, formerly a senior staff member for Senator Max Baucus (D-Mont.), who is currently Chairman of the Finance Subcommittee on Tax and Debt Management.

CORETECH has so far focused on tax issues, which reflects its origins in a bygone lobbying organization, the Coalition for the Advancement of Industrial Technology (CAIT), which is credited with two of the very few goodies written into last year's comprehensive tax-reform legislation: continuation of the R&D tax credit (though at rate of 20 rather than the original 25 percent) and initiation of a tax credit for industrial support of R&D in universities and non-profit institutes.

CAIT, which was directed by lawyer Kay, self-destructed, as planned, when the tax battle was over, and thoughts then turned to assembling a broader coalition to lobby on research issues. As Kay explained it to SGR, "The success on the tax credits for research in universities led some universities to ask if there were other goals that might be pursued."

A crucial break occurred when a membership was taken by the Association of American Universities (AAU), a 56-member combine that serves as the Washington voice of big academic science. The AAU came in as a single member; many of the universities in its ranks have also taken membership in CORETECH.

In reference to the alliance with industry, Robert Rosenzweig, President of the AAU, was quoted March 3 in the *Wall Street Journal* as saying, "It is a recognition of mutual interest between two sectors that also have separate interests." Rosenzweig chairs CORETECH's research policy committee.

In the current session of Congress, CORETECH is focusing on extending the two tax credits, which expire at the end of 1988, and is also lobbying to wipe out a tax provision, Section 861, which requires industry to allo-

(Continued on page 4)

Big Institutions in the Lineup

Many of the country's biggest are among the 112 firms, universities, industrial and higher-education associations, and research organizations that belonged to CORETECH as of March 20.

The corporate members include IBM, Digital Equipment, Hewlett-Packard, DuPont, Pfizer, Squibb, and Upjohn.

University members include Caltech, Cornell, Harvard, MIT, Northwestern, the UC system, Stanford, SUNY Buffalo and Stony Brook, universities of Michigan, North Carolina, and Tennessee.

In the category of "public and private associations," the members include the American Electronics Association, the Motor Vehicle Manufacturers Association, the Pharmaceutical Manufacturers Association, the Semiconductor Industries Association, and the Southeastern Universities Research Association.

Five research institutes are members: ITT, Houston Area Research Center, Microelectronics & Computer Technology Corp., National Biomedical Research Foundation, and Research Triangle Institute. In addition, several organizations are listed as "affiliates," including NCR Corporation and TRW.

The Chairman of CORETECH is Joseph A. Saloom, Senior Vice President, M/A COM Components; the following are Vice Chairmen:

Illene Jacobs, Vice President for Finance, Digital Equipment

Stanley Ikenberry, President, U. of Illinois, Urbana

Richard Iverson, President, American Electronics Assoc.

George R. Herbert, Director, Research Triangle Institute

Secretary, Peter F. McCloskey, President, American Electronics Institute

Treasurer, John G. Boyd, IBM Program Director of Public Affairs

CORETECH operates out of the law offices of Preston, Thorgrimson, Ellis, and Holman, 1735 New York Ave. Nw. Suite 500, Washington, DC 20006. CORETECH's Executive Director is Kenneth R. Kay.

Library of Congress R&D Studies Cover Wide Area

Many studies of research issues and collections of R&D data circulate around Washington without coming to wide public attention, though often they're influential in legislative and political affairs. Among these are the reports of the Science Policy Research Division (SPRD) of the Congressional Research Service (CRS), part of the Library of Congress.

CRS works for the Congress, and its reports are not offered to the public. But there is a way to get copies—by requesting them from a Congressman or Senator, who can order them from CRS. Following are some recent SPRD "Issue Briefs" (about 15 pages each) and short reports—both intended for harassed legislators and staff—that concern subjects of interest to the research community.

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Superconducting Super Collider (Order Code IB87096), by William C. Boesman, points out that the SSC is being proposed just as a budget surge for big R&D items is coming along, including SDI, the proposed doubling of the NSF budget in five years, plans to "map" the human genome, and the space station. The report warns that these items, "having timescales and funding magnitudes similar to those of the SSC, will be competing for Congressional attention and budget dollars in this and the next several Congresses." Included are a brief history of high-energy physics, a list of the major accelerators in operation and under construction around the world, and the SSC's history, projected budgets and benefits, and relative place in overall R&D spending.

•

Trade, Technology, and Competitiveness (Order Code IB87053), by Wendy H. Schacht, states that, in responding to foreign industrial competition, "the tendency of many federal efforts to focus on R&D (and particularly basic research) has resulted in less attention on other important issues," including the "commercialization and diffusion of products and processes . . . " The report adds that budget pressures "make it doubtful that the Congress would pass and the President would sign measures to improve technological competitiveness which would require major new commitments of federal funds." Among the options listed are encouragement of private-sector spending and an "assessment of the distribution of federal funds between military and civilian R&D with respect to improving innovation in the civilian marketplace."

•

Federal Funding for AIDS Research (Order Code IB87028), by Judith A. Johnson, lists year-by-year and agency-by-agency federal funding for AIDS research, starting with the $200,000 spent in fiscal 1981 and carrying through to requests totaling $533 million for next year.

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Research and Development Funding: FY88 (Order Code IB87083), by Michael E. Davey and the SPRD Research and Development Team, updated to March 9, this on-going series covers R&D budgets of federal agencies from Fiscal 1985 through the requests for 1988, now under consideration in Congress. The report notes that Congress may repeat its FY86-87 performance by "cutting the proposed increase for DoD R&D, restoring some funds for selected DOE as well as NIH programs, and perhaps trimming NSF's requested 17 percent increase." It adds that "there is a growing concern in the scientific community that funding to individual investigators, primarily through basic research, may be on a collision course with some of the Administration's proposed large R&D projects [SDI, SSC, space shuttle and station] . . . Congress may have to decide the extent to which it can fund these large R&D ticket items, without jeopardizing the nation's basic research program."

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Supply and Demand for US Scientists and Engineers: Brief Overview of the Current Situation and Future Outlook (87-168 SPR), by Edith Fairman Cooper (33 pages), pulls together data from a wide variety of man-

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CORETECH

(Continued from page 3)

cate a portion of domestically performed research to foreign income. Industry claims the provision is a disincentive to domestic research.

Tax issues are not without interest for the non-profit world of academe, but more was required to attract the many major universities and higher-education associations that have flocked to CORETECH. The lure was an agenda that would enlist CORETECH's lobbying prowess in behalf of academic science's interests in Washington.

Thus, in looking beyond the tax items, CORETECH announced on March 26 that it would concern itself with a flock of issues high on the academic agenda, including: renovation and construction of research facilities, modernizing laboratory research instrumentation, indirect costs of research, and "government spending on basic research."

Riding the competitiveness theme, CORETECH also announced that its "workplan will extend beyond the immediate need to protect current R&D programs and raise their visibility in the competitiveness discussions and will include assembling a forward-thinking, long-term research and development public agenda." It added that "CORETECH's goal is to create an active and visible constituency for basic and applied research."

In Quotes: R&D Leadership Doesn't Always Pay Off

With science now exalted by politics as an elixir for America's industrial woes, a plunge to reality is inevitable. A good push is provided in "Science, Technology, and Economic Growth," a paper presented in February at the annual meeting of the American Association for the Advancement of Science by Nathan Rosenberg, Professor of Economics at Stanford University. Following are excerpts.

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Americans (and especially members of the scientific community) have exaggerated the purely economic benefits that flowed from leadership at the scientific frontier.

This is not a denial that great economic benefits flow from the conduct of scientific research—rather it is a denial that these benefits necessarily flow in the form of competitive advantages to the country conducting the research. Great Britain's experience in the postwar years convincingly demonstrates the insufficiency of high-quality science when it is not associated with the complementary managerial and engineering skills, and when the economic environment is one that does not offer a sufficient prospect of high rewards to technological innovation or the adoption of newly available technologies.

On the other hand, the experience of Japan has forcefully demonstrated the remarkable possibilities for economic growth based upon the systematic transfer and exploitation of foreign technologies. Given the appropriate managerial, engineering, and organizational skills—admittedly a large "given"—and so long as more advanced technologies are available from abroad, rapid economic growth is possible.

To a far greater degree than we once believed, a first-rate, domestic scientific research capability is neither sufficient nor even necessary for economic growth. This should not be terribly surprising. The fruits of scientific research have always been portable . . . .

Thus, although the US pioneered at both the scientific and technological levels in the sequence of events that led to the invention of the transistor and integrated circuit, Japan was the first country to succeed in the large-scale manufacturing of transistor technology for radio and she simply obliterated America's earlier dominance of color television.

It is still more common than it should be to characterize the Japanese as mere imitators or borrowers, in spite of the fact that at the technological level, they have already attained positions of leadership, or near leadership, in a number of fields: fiber optics, composite materials, fermentation processes, computer peripherals, memory chips, numerically controlled devices.

The Japanese have had a highly R&D-intensive economy for a long time. Although the American share of GNP has been considerably higher than the Japanese until very recently, that differential has been entirely accounted for by the very large share of US R&D that is devoted to military purposes. If one compares civilian R&D expenditures in the two countries, it appears that the Japanese share has exceeded that of the US for at least a quarter of a century. Furthermore, the share of R&D that is privately financed is higher in Japan than in the US or other industrial countries. This suggests strongly that Japanese success in high-technology industries has been heavily built upon providing appropriate incentives to private industry, rather than (as is often complained) heavily government-subsidized programs.

Finally, Japanese R&D has been heavily concentrated in applied directions, although the basic-research component has become more prominent in recent years. It has also had a strong focus on monitoring and assessing R&D activities throughout the industrial world. I suggest that devoting more resources to finding out what is going on outside the US is one of several ways in which we might benefit from imitating the Japanese.

CRS Reports

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power studies, and stresses the many uncertainties, noting that "Many experts feel that . . . shortages, particularly in engineering, are in the eye of the beholder." But also states that verified shortages do exist in certain areas, and that "the engineering college faculty shortage as well as the graying of S/E faculty, in general, may play an important underlying role in the United States' ability to continue its current scientific and technological lead in the world."

•

Renewable Energy Technology (87-297 SPR), by Michele Passarelli (CRS Environment and Natural Resources Division) and Fred Sissine (31 pages), states that federal R&D spending for renewable energy technologies has dropped by 80 percent since 1980 and "US firms have lost their dominance in wind and photovoltaic markets." Recommends that Congress consider the adequacy of current R&D efforts and whether "it is necessary to do more than R&D to maintain a domestic capability and improve US firms' capability to compete for overseas markets." The report also urges consideration of the need for "innovative ways of supporting manufacturing and export activities" to assist US industry."

Academy Flourishing as Press Wins Second Term

Frank Press has been elected to a second six-year term as President of the National Academy of Sciences, which has shed a lot of its ancient creakiness and gained influence and wealth under his direction.

The Press presidency has been marked by shrewdly cast studies of politically sensitive issues, such as national security intrusions into freedom of scientific communication and Pentagon-induced crackpot controls on high-tech exports. The Press formula for credibility and political impact centers on the inclusion of national security heavyweights in the study groups. In the case of export controls, the 21-member panel was chaired by a former Air Force Chief of Staff, Lew Allen Jr., and included Bobby R. Inman, former Deputy Director of the CIA; Melvin Laird, Secretary of Defense under Nixon, and John S. Foster Jr. a former chief of Defense research and nuclear-weapons specialist.

Released in February, their report, *Balancing the National Interest: US National Security Export Controls and Global Economic Competitiveness,* was quickly embraced by the pro-export Commerce Department and influential members of Congress. Richard N. Perle, the Pentagon's preeminent hardliner, bad-mouthed the report all over Washington, and ended up discredited and foolish-looking.

Successful Fund Raising

In recent years, the Academy has engaged in vigorous fundraising to gain flexibility in choosing its subjects, rather than relying on contracts from federal agencies to set its agenda. In 1981, the NAS budget was $77 million, of which seven percent came from non-government sources; last year, the comparable figures were $112 million and 13 percent.

The big hole in the NAS agenda is the absence of an inquiry into the biggest technological program in history—the Strategic Defense Initiative. The Reagan Pentagon and the NAS—headed by Jimmy Carter's White House Science Adviser—have never got along well. Press has said that without cooperation on classified data, a study of SDI would be flawed, and he has left the implication NAS didn't feel confident of getting the needed cooperation. It surely didn't in its study of exports, though that didn't turn out to be as serious a handicap as was originally feared.

Also of note is the coziness that has developed between industry and the NAS during the Press presidency. Industry provides a lot of the unattached money that Press has been seeking—though contributions are bunched to avoid any one dominant source, and the money is diluted with grants obtained from foundations. But, increasingly, the Academy is marked by a new, sympathetic concern for industrial needs. A token labor-union type or two may be included on an Academy committee, but never more than that.

In any case, Press goes into his second term with the Academy flourishing. He's assembled a strong staff. Thanks to a $20 million gift from Arnold Beckman—to be equally shared with the Academy of Engineering—NAS has a western outpost, in a conference center in Irvine, Calif. More than ever, Congress looks to the Academy as an independent fount of wisdom on scientific and technical matters.

All hands in and around the Academy attribute the gains to Frank Press. His speaking style, at once overly earnest and soporific, tends to conceal the fact that he's one of the shrewdest and most effective operators in a city renowned for that breed.

To the Editor:

Tech Review, Sciences, Science86

I thought the point in your January 15, 1987, issue was well taken that *Science86* might have survived if it had followed the example of *The Sciences* [published by the New York Academy of Sciences] and sought more revenue from subscriptions and other sources, and less from advertising based on expensive circulation promotion.

I wondered why you did not mention *Technology Review* [published at MIT in association with the Alumni Association of MIT]. Like *The Sciences,* we are published by an institution for a national audience, and we cover a somewhat broader range of issues, including technology as well as science. As with *The Sciences,* our revenue comes primarily from outside paid circulation and institutional subscribers. (Our standard subscription rate is $24 annually, and we have about 40,000 outside subscribers. MIT gives us $15 for each of our 40,000 alumni subscribers.) Our circulation has grown modestly without increases in promotion costs, and we are on a sound financial basis.

Wouldn't it have been more legitimate—and strengthened your case—to mention us as well as *The Sciences*?

Jonathan Schlefer
Managing Editor, *Technology Review*
MIT, Cambridge, Mass.

•

SGR Editor's Note: Schlefer is correct. The quality, success, and prudent financial strategy of *Technology Review* further illustrate the point that *Science86* was needlessly and hurriedly scuttled by the panicky managers of the American Association for the Advancement of Science.

OTA's Other Role: Filling Posts on Special Panels

The Office of Technology Assessment is best known as analyst in residence for the Congress and producer of hefty reports on public issues. But, with little notice, it has also evolved into another role: talent scout for selecting committees of specialists to advise the federal bureaucracy.

As directed in a comprehensive health bill passed last year, OTA recently picked the 15 members for a non-governmental Advisory Panel for Alzheimer's Disease that will serve the Congress and the Department of Health and Human Services.

By statute OTA is also responsible for selecting members for the Physicians Payment Review Commission, which helps set rates for medical services under Medicare, and the Prospective Payment Commission, which advises on Medicare reimbursements for hospital services.

OTA is also screening candidates for the 14-member advisory committee that will serve the Congressional Biomedical Ethics Board, an inhouse think tank voted into existence by Congress in 1985, but not yet in operation. OTA's screening services for the Board were requested on an informal basis by Board Chairman Willis Gradison (D-Ohio) and Vice Chairman Albert Gore (D-Tenn.)

The assignment of these tasks to OTA reflects Congressional fears of polluted advice in the capital, along with confidence in OTA's purity. Rarely ever have accusations of partisanship been directed at OTA's reports. But when they have, OTA's work has stood up very well under hostile scrutiny. Such was the case when Administration hardliners sought to discredit OTA's skeptical analysis of the Strategic Defense Initiative (SGR Vol. XIV, No. 12).

The desirability of OTA putting its stretched staff power into this appointive work is a separate matter. But there's no doubt that it pushes OTA further into the role of a short-order job shop for a harassed Congress. In response to the close horizons of the Congressional process, OTA has virtually abandoned the long-range look at emerging technologies which was heavily emphasized in the debates that led to its creation 15 years ago. It now focuses on current legislative issues, because that's what Congress, facing elections every two years, is concerned with.

Congressional confidence and popularity have accompanied this shift, but the fact is that no one on Capitol Hill is trying to look more than a few years ahead of the current legislative agenda.

Diverse Membership on Panel

With numerous disease lobbies seeking attention in Washington, the newly created Advisory Panel for Alzheimer's Disease represents a big political step up for this interest and portends bigger budgets for Alzheimer's research. The Panel will be administered by the Department of Health and Human Services, which will appoint the Chairman. The Panel will meet twice a year and will write an annual report for the Congress and HHS. The members were drawn from five categories: biomedical research, health services research, long-term care providers, financing, and national voluntary organizations. They are:

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John P. Blass, Director, Dementia Research Service, Burke Rehabilitation Center, NY; Professor, Neurology, Cornell Medical College

Elaine M. Brody, Director, Department of Human Services, Philadelphia Geriatric Center

Kathleen C. Buckwalter, Associate Professor, Geriatric Mental Health, College of Nursing, U. of Iowa

David F. Chavkin, financial, legal specialist; member, Md. Governor's Task Force on Alzheimer's Disease

Kenneth L. Davis, Director, Alzheimer's Disease Research Center, Mt. Sinai (NY) School of Medicine

David A. Drachman, Professor, Neurology, U. Mass. Medical Center; Co-Director, Mass. Alzheimer's Disease Research Center

Dorothy Kirsten French, former opera singer; founder, John Douglas French Foundation for Alzheimer's Disease

Lisa Pepper Gwyther, Director, Aging Center's Family Support Program, Division of Psychiatric Social Work, Duke U.

Ethan Hitchcock, Alzheimer's Disease and Related Disorders Association, NY

Thomas J. Jazwiecki, Director, Reimbursement and Financing, American Health Care Association, Wash., DC

Robert L. Kane, Dean, Public Health, U. of Minn.

Robert Katzman, Professor of Neurosciences, UC San Diego

Eric B. Larson, Professor, Public Health, U. of Wash.

Joseph M. Weiner, Brookings Institution, Wash., DC

Louis H. Weinstein, Mass. attorney

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Survey Reports Big Gaps in High School Science

The final returns are in from a broad survey of high school science teaching last year and they show big holes in the American educational structure.

Conducted by the National Science Teachers Association, and released at the NSTA's 35th national convention last month in Washington, the survey indicated that among the nation's 24,000 public and private high schools, 7100 offered no physics courses; 4200 offered no chemistry, and 1900 no biology.

The NSTA says that the situation is worse than those numbers suggest. Of the schools offering physics, 63 percent offered only one section while 90 percent had two or less sections. The comparable figures for schools offering chemistry were 37 percent with only one section and 67 percent with two or less. In biology, 18 percent had only one section and 43 percent had two or less. The NSTA derived these findings from a random sample of 2211 high schools employing 8539 science teachers.

Among other findings of the NSTA:

• "Far fewer science courses are taught by non-science faculty than previously believed." The survey indicated that the interdisciplinary traffic consists more of "science teachers picking up a course in non-science, rather than non-science teachers teaching science."

• Few science teachers teach a single discipline; they're more likely to be spread out among various science courses.

• "Non-public schools offer more 'hard' subjects like physics than do public schools; whereas public schools offer more 'soft' sciences like biology and environmental science. However, in the hard subjects like physics and chemistry, there is greater use of the computer in the public schools than in the non-public schools."

• Some two-thirds of science teachers are males, but in physics, 76 percent of the teachers are males.

A major conclusion to be drawn from the survey, the NSTA stated, is that "The idea that one prepares to be a physics teacher, biology teacher, or chemistry teacher for high school in the same way as for a college position is defective. High school science teachers are more nearly that: Science Teachers, not single discipline teachers.

"The implications for this fact for pre-service preparation and for licensing and certification are obvious," the NSTA analysis continued. "What is clearly needed is preparation for multi-assignments, preferably in related disciplines. For example, we need persons trained in physics, chemistry, and mathematics in one undergraduate program. These persons need to be licensed and certified for these three fields. Then, under no circumstances should they be assigned to other fields."

Looking at the role of federal assistance for pre-college science programs, the NSTA stated that "An important conclusion of this survey is that the retraining task for teachers out-of-field is not nearly so formidable as previously believed. Since most out-of-field science teaching is being done by science teachers prepared in another field of science, the retraining time is greatly shortened . . . . This means that NSF institutes or workshops have a far greater potential for improving the situation than if we were dealing with non-science personnel. The implication, however, is that NSF and other support be provided for the second or third field of a teacher, rather than in his or her major field of study.

"Even if, for example, a physics teacher has only 20 or 30 credits in physics," the survey analysis stated, "it is far more important to provide the needed training in chemistry or biology, where the teacher may be teaching on a misassigned basis and for which he or she has no course work."

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(*Survey Analysis of US Public and Private High Schools: 1985-86*, $2.00, NSTA, Publications Office, 1742 Connecticut Ave. Nw., Washington, DC 20009; tel. 202/328-5865.)

Science & Government Report
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